

Name _____ Date _____ Hour _____

My Partners are:

Name	Email

The "brain" DROP

Overview

For the past several weeks, we have been studying the brain. You have learned how the brain can be injured and how the body works to protect the brain.



We are going to simulate an accident involving the brain in class. Your "brain" will be an egg. You will design a "body" to protect it from a series of leveled falls. Your group will be responsible for collecting materials and creating a design to protect your egg. Your design must **not** include changing the egg in any way (no tape on the egg, no nail polish on the egg, no hollow eggs, no boiled eggs, ...).

Your first goal is simple, design and build the smallest system (no larger than 432 in³) you can that will protect an egg from a **1 meter (3.3 feet) drop**. Eggs that smash or crack fail the test while eggs that survive without a scratch pass!

Your second goal is more challenging: design and build the smallest system (no larger than 432 in³) you can that will protect an egg dropped from the **top of the stairwell to the bottom**. Eggs that smash or crack fail the test while eggs that survive without a scratch pass!

**Your egg must pass at the 1 meter level before you can move on to the stairs level; you do not have to use the same design for each level*

You will write a lab report with all the standard sections and produce a final product to describe your work. In this project, you should be trying to apply some of the knowledge about the principles of engineering design and about the anatomy of the brain.

Each group will be provided with the option to use the following class materials:

a tarp for the drop zone	a meter stick	3 total eggs
3 total paper towel/ toilet paper tubes	30 inches of yarn / string	10 paper towels
6 total balloons	3 total ziplock sandwich bags	1 paper cup
5 total plastic grocery bags	1 foot of tape	

- students may bring in any additional materials they wish to use them.

IMPORTANT

- You will not be allowed to test your drop until your journal is complete FOR EACH TRIAL

Name _____ Date _____ Hour _____

DEMONSTRATION Journal

Watch the teacher's demonstration and RECORD YOUR OBSERVATIONS. Be sure to include quantity (numbers/ measurements) and quality observations

Drawing of Egg BEFORE	I saw...	I felt...	I heard
	1.	1.	1.
	2.	2.	
	3.		
	4.		
	5.		

1. What do you think will happen to the egg when the teacher drops it?

Drawing of Egg AFTER	I saw...	I felt...	I heard
	1.	1.	1.
	2.	2.	
	3.		
	4.		
	5.		

Hint: "Some" means more than one.

1. What can you measure about the "drop zone"?
2. What are some things you learned from the demonstration?
3. What are some questions this demonstration raises in your mind?

Name _____ Date _____ Hour _____

BACKGROUND RESEARCH journal

Thinking prompt: What are some ways you think the teacher could have prevented the egg breakage in the demonstration?

Research Question	What technology do we have to prevent injuries in high impact situations (think car crashes) and what is the goal of each type of technology?
What I Already Know	

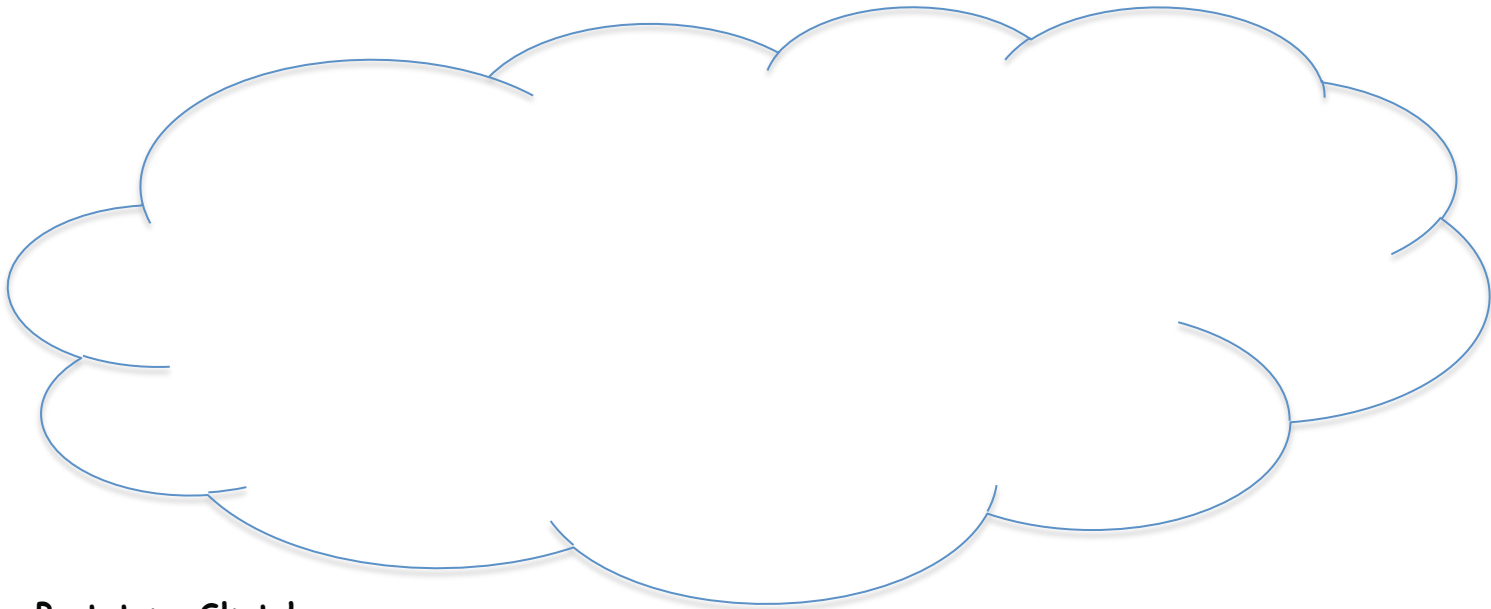
	Title	Facts	What information was new to you?	How helpful was the resource? 1 (not very) 3 somewhat 5 (very)
Source 1		1 2 3		
Source 2		1 2 3		
Source 3		1 2 3		

Summary of your findings	
How this can help you in planning your "body" for the egg drop	

BRAINSTORM journal

Working independently, write down your ideas for the "body" you want to make for the egg drop. Once you have a list of several ideas, make a sketch to show what your container would look like from the top, side and bottom. Since this is your first sketch of your ideas, it is called a prototype.

IDEAS



Prototype Sketch

Top	Side
Bottom	

Name _____ Date _____ Hour _____

Group Brainstorm Discussion Journal

Once all group members have completed a brain storming journal, you will meet together to share at your ideas. You are going to discuss what is the **same and different** about your prototypes. It is important that you listen to each other. Working well in teams is a life skill that takes practice. Use the sentence starters in your conversations. Take you time and make sure you are not just hearing your partners, but also *listening* to them. Be open to other's ideas. It is important that you work well with your team to determine your group plan and **why** you think it will safely protect your egg during its fall.

RULES FOR THE DISCUSSION

1. Be respectful
2. Take turns
3. This is NOT about your idea winning or losing, this is about working together to make a plan.

Soliciting a Response

What do you think?
We haven't heard from you yet. Do you agree?
What do you propose?

Language of inquiry

I want to ask you about...
Could you expand a bit on what you said about...
Sorry, I am not quite clear on...

Expressing an idea

I think/ believe that....
In my opinion...
Based on my experience, I think....

Language of agreeing

My idea is similar to...
I agree with (person) that...
I don't agree with (person) because

Paraphrasing

So what you are saying is..
In other words, you think...
What I hear you saying is...

Summary of our discussion:

These are the most important things that were the same in our prototypes and ideas.

Attribute/ idea	Why we think we need to include it	Material we need for it

These are our biggest concerns

Concern	Person raising concern	Reason for concern

Name _____ Date _____ Hour _____

Group "body" design and Reasoning journal

Group's Prototype Sketch

Top	Side
Bottom	

List of materials needed (do not include the egg)

Item	Amount needed / measurement	Why we chose this item

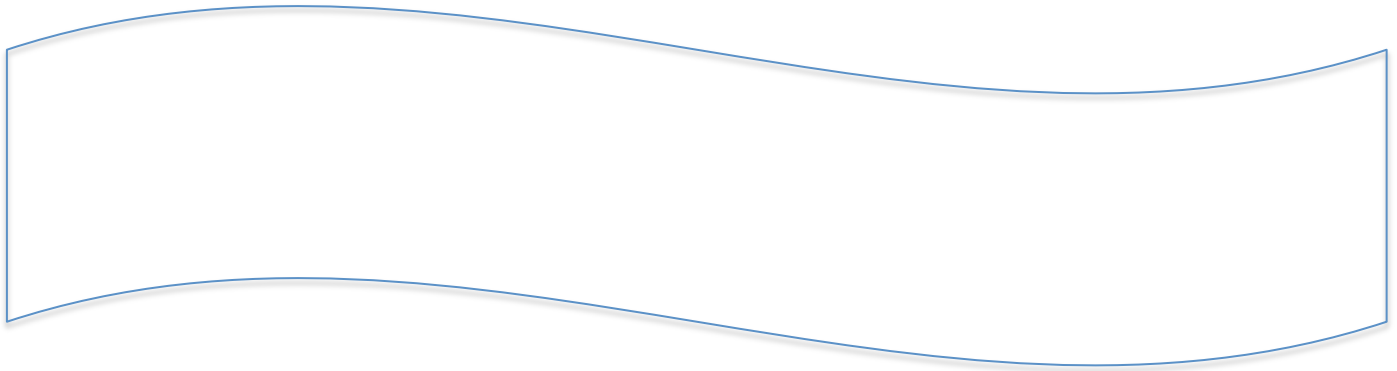
Notes or comments:

Name _____ Date _____ Hour _____

Slogan and sales journal

Before we drop the eggs, we will do a "shoppers showcase" of our "body" designs. You will explain your packaging process and the concept behind it to the class. Your presentation will be <2minutes and must include a slogan. On the next sheet, you will record information from your classmates presentations.

Our Team Slogan



A picture of our product:

Our packaging process:

Why we chose this method:

Name _____ Date _____ Hour _____

Test Observations and Data Journal

Table 1 - First test of the 1 Meter Drop

Group	Container description	Egg Condition			Notes / observations
		Undamaged	Slightly Damaged	Badly Crushed	
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

GRAPH YOUR DATA (container type vs egg condition)

Table 2 - Tally of Survived vs Broken Eggs

Eggs that survived undamaged	Slightly damaged or badly crushed eggs

GRAPH YOUR DATA (pie chart)

Name _____ Date _____ Hour _____

Reflection journal

1. Did your craft survive the fall?
2. What material was **most important** in your design?
3. What material that you used was least effective?
4. What **was successful** in the design of your craft?
5. In your class, which packages were the most **creative**?
6. In your class, which designs were the most **effective**, and why?
7. Beyond the materials, which **features** of the packaging helped cushion the fall?
8. What **material** would you use in another design that you did not use today, and WHY?
9. Knowing what you know now, how would you **improve upon your design** to make it work better on the next try?

Name _____ **Date** _____ **Hour** _____

Journal writing: students explain the outcome of their egg drop, and the success and failure of their design, as well exploring ways in which they might improve upon their design. They assess the design of the other teams, evaluating best and worst choices and suggestions to improve the packaging of those that broke.